ALABAMA PRISON ARTS + EDUCATION PROJECT

THE WARBLER

AN EDUCATIONAL WEEKLY

ISSUE
82
NOVEMBER 2, 2021

Dear Artist, Scientist, Creator,

In my mind, mountains are not only some of nature's most majestic creations but also symbolic for life's journey. Climbing Mount Everest is a feat that few are able to complete, but really, once you climb the tallest mountain, there is still more in nature to explore. Once we finish a big task or make a monumental achievement, life still goes on. We still have more to do.

There is also something mysterious about mountains, since they are so ginormous that they make us feel like ants. They are a reminder of how big this planet really is. Mountains are seen as the home of the gods in Greek mythology, and they're mentioned multiple times in different regards within the Bible. Primarily though, in modern religion, we often see them as representing Heaven or the peak of constancy, spirituality and consciousness. The origin of the mountains themselves is a question that scientists are continuing to find answers to even today. Tectonic plates, which are basically fragments of the Earth's crust, are likely to be a cause of their formation.

The drastic changes in altitude lead not only to a higher viewpoint of the world around the mountain, but life in general functions differently as you approach the top. Temperatures drop, the amount of oxygen in the air changes, along with even the wind and the sunlight. The same species can adapt to a completely different way of life depending on each individual's location on the mountain. Water flows down from them, creating massive waterfalls, and unfathomable quantities of ice tumble down from them every day. There are different kinds of mountains with some holding molten lava from deep below the surface of the Earth, and some which extend from deep below sea level. Each variety produces drastically different conditions for life. People have resided on them for millennia, braving bitter cold and thriving in conditions with few large life forms.

Mountain ecosystems are some of the most biodiverse ecosystems on Earth simply due to the varying conditions that exist as we ascend them. It's easier to think of them as multiple miniature ecosystems resting within such a small range geographically. It's not hard to find them in America either, even in Alabama, with the foothills of the Appalachian Mountains. Some of Alabama's natural phenomena are direct results of mountain formation. Clearly, mountains are profoundly influential on the world in which we live and the way that we see it. With that, we hope you enjoy this week's edition of *The Warbler* as you catch a tiny glimpse of Earth's mountains.

Taylor and the APAEP Team

WORDS INSIDE

FOUND INSIDE "WHY ARE MOUNTAINS SO HIGH ..."

anomaly | something that deviates from what is standard, normal, or expected

erosion | the gradual destruction or diminution of something

incise | in geology, for a river to erode downward, lowering its bed and leaving steep slopes along either side

retrospect | a survey or review of a past course of events or period of time

FOUND INSIDE "EARTH'S MOUNTAINS MAY HAVE ..."

zircon | a mineral common in the crust of Earth that is the source of the metal zirconium

puny | small and weak

indestructible | not able to be destroyed

"Everyone wants to live on top of the mountain, but all the happiness and growth occurs while you're climbing it." **ANDY ROONEY** // American radio and television writer

GEOLOGY

Why are Mountains So High? It Doesn't Add Up

STANDFORD'S SCHOOL OF EARTH, ENERGY, AND ENVIRONMENTAL SCIENCES | *Science Daily* | September 23, 2019

Over millions of years, Earth's summits and valleys have moved and shifted, resulting in the dramatic landscapes of peaks and shadows we know today. Mountains often form when pressure under Earth's surface pushes upward, yet many factors impact their ultimate height, including the erosion of the areas between mountains, known as channels.

Scientists have long assumed that as land is pushed faster upward to form a mountain, its height increases in a continuous and predictable way. But new research shows that these predictions may stop working for the steepest mountains and therefore limit their height —and this may hold true for ranges on the entire planet.

"People have argued for a long time that as channels get steeper and steeper, the erosion rate keeps increasing," said George Hilley, a professor of geological sciences at Stanford University's School of Earth, Energy & Environmental Sciences (Stanford Earth) and lead author of a study published in *Nature Geoscience* Sept. 16. "We find that the theory works really well until a certain point and then it breaks down empirically — it seems as though something else kicks in that we don't completely understand."

The researchers analyzed samples from a broad range of mountain landscapes across the tropics, including Venezuela, Brazil, Guatemala, Costa Rica and Taiwan, controlling for rock type and climate conditions to assess parallel comparisons. They found that after mountains reach a certain elevation, channels between mountains suddenly become extremely sensitive to subtle changes in their inclines, thereby limiting the height of the mountains above. They added data from hundreds of mountain ranges worldwide and found they followed a similar pattern: the height, or relief, of the landscape is capped after crossing a threshold driven by channel steepness.

"Areas of land above channels are likely being controlled by how quickly a river can cut down — this is the framework by which we understand how the height of mountains varies as a function of climate and the collision of continents," Hilley said. "The anomaly we observed is kind of a mystery and is not necessarily what conventional theory might predict."

Research impacts

By bringing evidence of this mysterious factor influencing mountain height, the research could impact other work, such as studies on the relationship between mountain erosion rates and climate — important elements for understanding ancient climate and forecasting future patterns.

"Our work adds an interesting depth to some of these studies, because the way in which Earth's topography changes as climates become more or less erosive may also change as the threshold is approached," Hilley said.

The work also has implications for the geophysical links of mountain formation, which scientists are interested in exploring to understand the hidden activity of tectonic movements below our feet.

"People like me have always hoped that you could actually use the topography in order to say something about how quickly faults might be slipping," Hilley said. "What our results say is that you can still do that in landscapes that are moderately steep, but it might become increasingly difficult as landscapes become steeper."

Global patterns

The scientists took a fundamentally different approach to the research by searching the globe for conditions that reveal changes in mountain height rather than focusing on just one location. That search led them to focus on ranges in the tropics, but the conclusions were consistent across all regions of the globe and may also be applied to understand ancient topography.

"The Himalayas are being uplifted pretty rapidly and they expose pretty hard rocks, and indeed, when you measure them out, they are pretty close to this threshold," he said. "You might be able to take this threshold with just the modern configuration of the landscape and actually place some upper bound on what the topography of the ancient Himalayas looked like."

Hilley said the results of the study were surprising, as well as the fact that they remained consistent when compared with global data.

"In retrospect it makes sense when you look at it from the overall context of what our planet actually looks like," Hilley said. "It really speaks to the fact that there might be lots of fertile ground to explore why this might happen. It also points to the fact that there might be something about the way in which rivers incise that we just don't understand yet." ●

"The hardest mountains to climb are the ones within."

J. LYNN // American author

ECOLOGY

Mountain Biomes | Life at High Elevation

BY JENN SAVEDGE | Treehugger.com | March 17, 2017

Mountains are a constantly changing environment, in which plant and animal life varies with changes in elevation. As elevation changes, temperatures get colder, tree species change or disappear altogether, and the plants and animal species are different than those found on lower ground.

What makes a mountain? | Inside the Earth, there are masses called tectonic plates that glide over the planet's mantle. When those plates crash into one another, they push the Earth's crust higher and higher into the atmosphere, forming mountains.

Mountain climates | While all mountain ranges are different, one thing they do have in common is temperatures that are cooler than the surrounding area thanks to higher elevation. As air rises into the Earth's atmosphere, it cools down. This affects not only the temperature but also the precipitation.

Winds are another factor that make mountain biomes different from the areas around them. By nature of their topography, mountains stand in the path of winds. Winds can bring with them precipitation and erratic weather changes.

That means that the climate on the windward side of a mountain (facing the wind) will likely be different from that of the leeward side (sheltered from the wind). The windward side of a mountain will be cooler and have more precipitation, while the leeward side will be drier and warmer.

Of course, this too will vary depending upon the location of the mountain. The Ahaggar Mountains in Algeria's Sahara Desert will not have much precipitation no matter which side of the mountain you are looking at.

Mountains and microclimates | Another interesting characteristic of mountain biomes is the microclimates produced by the topography. Steep slopes and sunny cliffs may be home to one set of plants and animals while just a few feet away, a shallow but shaded area is home to a completely different array of flora and fauna.

These microclimates may vary depending upon the steepness of the slope, the access to the sun, and the amount of precipitation that falls in a localized area.

Mountain plants and animals | The plants and animals found in mountainous areas will vary depending upon the location of the biome. But here's a general overview:

Temperate zone mountains | Mountains in the temperate zone, such as the Rocky Mountains in Colorado, generally have four distinct seasons. They usually have conifer trees on their lower slopes that fade into alpine vegetation (such as lupins and daisies,) above the tree line.

Fauna include deer, bears, wolves, mountain lions, squirrels, rabbits, and a wide variety of birds, fish, reptiles, and amphibians.

Tropical mountains | Tropical areas are known for their species' diversity and this holds true for the mountains found there. Trees grow tall and at elevations higher than in other climate zones. In addition to evergreen trees, tropical mountains may be populated by grasses, heathers, and shrubs.

Thousands of animals make their homes in tropical mountain areas. From the gorillas of Central Africa to the jaguars of South America, tropical mountains host huge numbers of animals.

"Mountains are earth's undecaying monuments."

NATHANIEL HAWTHORNE // American novelist

Desert mountains | The harsh climate of a desert landscape — lack of rain, high winds, and little to no soil, makes it difficult for any plant to take root. But some, such as cacti and certain ferns, are able to carve out a home there.

Plants and animals flourish in this mountain ecosystem in North Wales.

Alan Novelli/ Getty Images

And animals such as big horned sheep, bobcats, and coyotes are well adapted to live in these harsh conditions.

Threats to mountain biomes | As is happening in most ecosystems, the plants and animals found in mountain regions are changing thanks to the warmer temperatures and changing precipitation brought on by climate change. Mountain biomes are also threatened by deforestation, wildfires, hunting, poaching, and urban sprawl.

Possibly the biggest threat facing many mountainous regions today is that brought on by fracking — or hydraulic fracturing. This process of recovering gas and oil from shale rock can devastate mountain areas, destroying fragile ecosystems and possible polluting groundwater via by-product runoff. ●

Edited for clairty

MATHEMATICS

Sudoku

#163 PUZZLE NO. 2921213

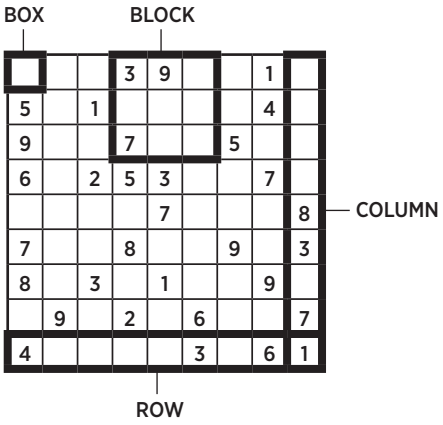
				6	2		8	4
		6	4					9
4			7					
	4			9		7		1
7	8				6			
		2						
	9			3				
			9		5			2
2						4		8

#164 PUZZLE NO. 6198392

			2					3
8			9					
	5			4				
6		2	3		4		5	
	8							
					6	4	3	9
		1		9		5		
					8		7	
	7				1		6	

SUDOKU HOW-TO GUIDE

1. Each block, row, and column must contain the numbers 1–9.
2. Sudoku is a game of logic and reasoning, so you should not need to guess.
3. Don't repeat numbers within each block, row, or column.
4. Use the process of elimination to figure out the correct placement of numbers in each box.
5. The answers appear on the last page of this newsletter.



What the example will look like solved

2	4	8	3	9	5	7	1	6
5	7	1	6	2	8	3	4	9
9	3	6	7	4	1	5	8	2
6	8	2	5	3	9	1	7	4
3	5	9	1	7	4	6	2	8
7	1	4	8	6	2	9	5	3
8	6	3	4	1	7	2	9	5
1	9	5	2	8	6	4	3	7
4	2	7	9	5	3	8	6	1

"Only mountains can feel the frozen warmth of the sun through snow's gentle caress on their peaks."

MUNIA KHAN // American poet

Icons from the Noun Project

DID YOU KNOW?

The **tallest mountain in the solar system** is Olympus Mons on Mars — a whopping 15.5 miles tall. For comparison, Everest is roughly 5.5 miles tall.

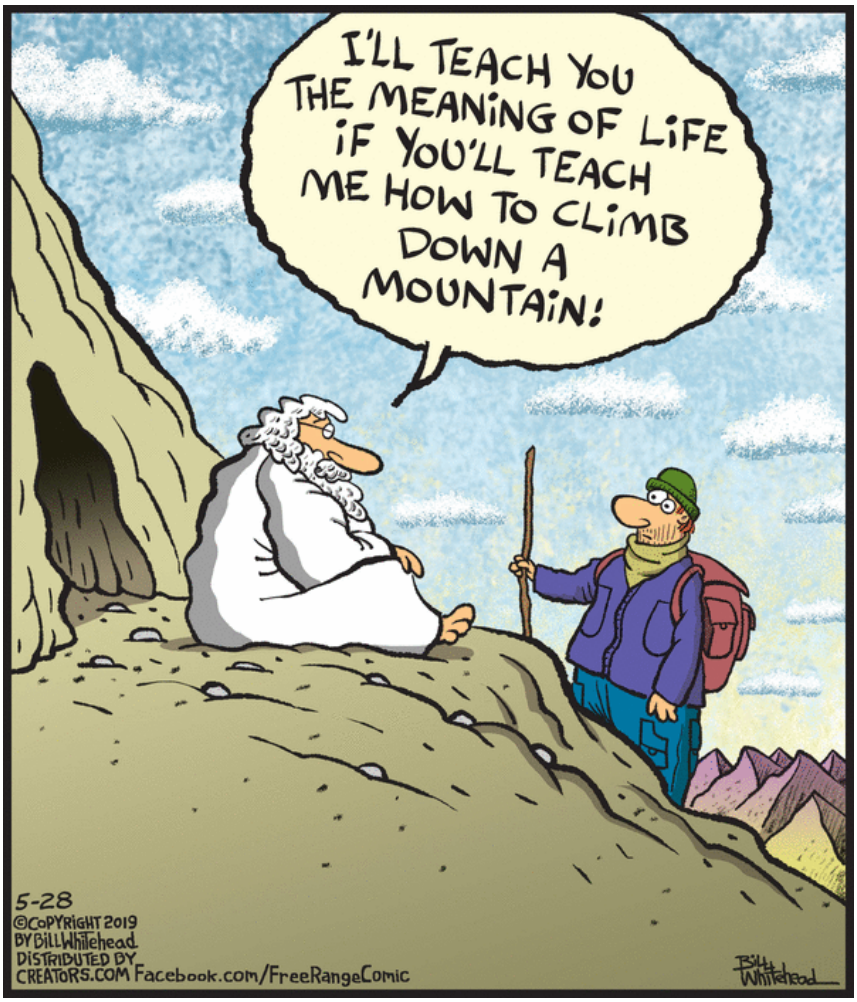
A researcher in the 19th century recorded witnessing nearly **17,500 avalanches** over the course of just one year in the Swiss Alps.

Many world mythologies, including Greek, Scandinavian, Hopi, Navajo, Masai, and Canaanite, held that **gods lived on mountaintops**.

Before the existence of devices such as GPS or altimeters, geographers measured mountains using a method called **triangulation**, which involved measuring the mountain peak from a variety of different observation points.

Thirty of the **world's highest mountains** are in the Himalayas.

Source: factretriever.com/mountain-facts



Idiom

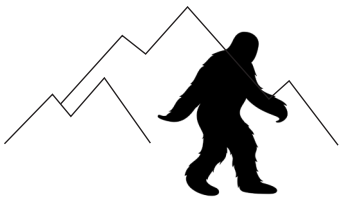
"Making a mountain out of a molehill"

Meaning Exaggerating, turning a minor issue into a bigger problem than it really is, overreacting

Origin The origin of the saying "making a mountain out of a molehill" is unclear, but what is known is that it's over 350 years old. For instance, the expression is seen in a lexicon book by James Howell from the year 1660. This book contains many proverbs from different languages. Of note, Wikipedia states that this saying was used in a book published in 1548 called *The first tome or volume of the Paraphrase of Erasmus vpon the newe testamente* translated in part by Nicholas Udall:

"The Sophistes of Grece coulde through their copiousness make an Elephant of a flye, and a mountaine of a mollehill."

Source: https://knowyourphrase.com/making-a-mountain-out-of-a-molehill



THE YETI, OR **ABOMINABLE SNOWMAN**, IS A MYSTERIOUS CREATURE BELIEVED TO LIVE ABOVE THE SNOW LINE IN THE HIMALAYAS. WHILE MOST DISMISS THE YETI AS A MYTH, THERE HAVE BEEN MULTIPLE EXPEDITIONS SEARCHING FOR THE ELUSIVE CREATURE.

ART + CULTURE

Night on the Mountain

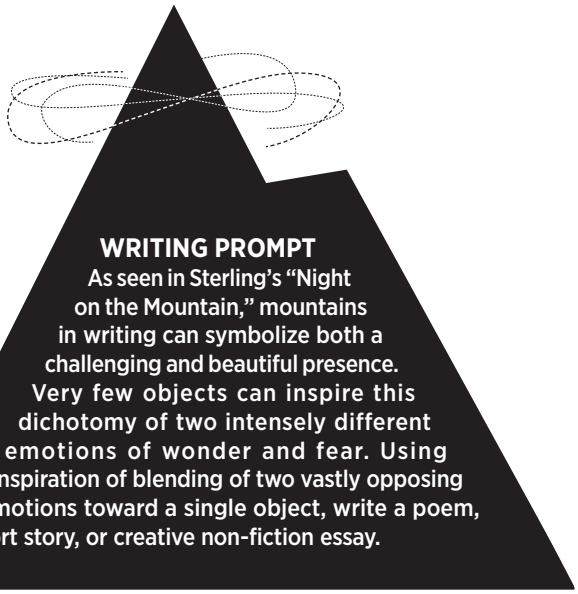
BY GEORGE STERLING

The fog has risen from the sea and crowned
The dark, untrodden summits of the coast,
Where roams a voice, in canyons uttermost,
From midnight waters vibrant and profound.
High on each granite altar dies the sound,
Deep as the trampling of an armored host,
Lone as the lamentation of a ghost,
Sad as the diapason of the drowned.

The mountain seems no more a soulless thing,
But rather as a shape of ancient fear,
In darkness and the winds of Chaos born
Amid the lordless heavens' thundering —
A Presence crouched, enormous and austere,
Before whose feet the mighty waters mourn.

poemhunter.com

George Sterling is a mid-19th American poet and playwright based in California. In 1903 he published a collection of poetry titled, *The Testimony of the Sun and Other Poems*, that made him renowned among other East Bay writers like Jack London. Known as an advocate for the movement of Bohemianism, Sterling even moved to Carmel-by-the-Sea in 1905 to establish a commune for other Bohemian writers and artists to live in to develop their work.

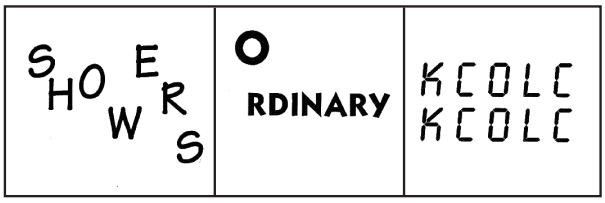


WRITING PROMPT
As seen in Sterling's "Night on the Mountain," mountains in writing can symbolize both a challenging and beautiful presence. Very few objects can inspire this dichotomy of two intensely different emotions of wonder and fear. Using inspiration of blending of two vastly opposing emotions toward a single object, write a poem, short story, or creative non-fiction essay.

Word Search

M	A	G	O	S	I	A	G	Y	N	F	O	G	R
N	O	M	O	U	N	T	A	I	N	H	R	N	Y
U	S	R	R	O	C	N	R	L	L	L	L	N	O
M	T	R	A	U	I	M	O	U	R	N	M	Y	C
T	S	U	A	O	I	I	S	N	O	H	W	F	H
M	E	V	M	D	E	O	V	L	T	I	T	T	A
O	O	I	I	N	C	W	A	T	E	R	S	A	O
A	R	U	D	O	T	I	L	T	I	O	O	W	S
N	V	R	N	R	O	N	M	N	A	M	O	N	G
R	N	N	I	A	F	I	O	N	O	A	M	N	H
N	I	M	G	I	A	Y	O	V	I	S	N	U	T
I	O	I	H	Y	N	D	S	N	N	O	O	M	S
E	C	I	T	A	T	R	A	M	P	L	I	N	G
H	G	I	C	N	F	E	C	I	O	V	A	I	U

MOUNTAIN
CANYON
SUMMIT
MOURN
CHAOS
WATERS
FOG
MIDNIGHT
VOICE
TRAMPLING



WORD PLAY A Rebus puzzle is a picture representation of a common word or phrase. How the letters/images appear within each box will give you clues to the answer! For example, if you saw the letters "LOOK ULEAP," you could guess that the phrase is "Look before you leap." *Answers are on the last page!*

CULTURE

In the Mountains of Georgia, Foxfire Students Keep Appalachian Culture Alive

BY ARI SHAPIRO | *National Public Radio* | November 3, 2016

By the time a group of high school students showed up at Richard Moss' home in 1980, he was an old man in his 80s.

He was a master of shape-note singing — a remarkable old style of music he learned from his elders, who learned it from their elders in the mountains of northern Georgia.

The students wanted to document the tradition for their magazine, *Foxfire*.

Named after a bioluminescent fungus that glows in the hills of North Georgia on certain summer nights, Foxfire started in 1966, when an English teacher in Rabun County was having a difficult time engaging his students. Out of ideas, he let the kids design the lesson. They chose to publish a magazine that would document the mountain culture all around them.

For 50 years, *Foxfire* students have recorded the disappearing traditions of Appalachia, and the stories of the region's mountain folks. They've told the stories of blacksmiths, moonshiners and woodworkers. The program's impact has rippled across the country: Projects modeled after Foxfire have popped up in schools from Texas to Maine.

And the books that grew out of that student-produced magazine became national best-sellers — out of 21 *Foxfire* books, 20 are still in print. They sold so well that in 1974, the proceeds were used to buy land and create a museum in the mountains dedicated to preserving Appalachian culture, the Foxfire Museum & Heritage Center in Mountain City, Ga. Set on more than 100 acres, the site is crisscrossed by walking trails and dotted with period buildings. It's a living, breathing museum, a home for traditions that are dying out — but worth preserving.

The culture of Appalachia is incredibly rich, says Barry Stiles, Foxfire's acting executive director. "It's also a culture that's often misrepresented, a lot of stereotypes with mountain people," says 53-year-old Stiles, who has roots in the region. "And so by preserving the culture and presenting it, people become educated to the truth about mountain people."

He describes these mountain people as "very resourceful, self-reliant, hardworking, intelligent and with an amazing sense of humor" — people like Buck Carver.

"My dad was a moonshiner," says Carver's daughter, 59-year-old Kaye Carver Collins.

"When the men landed on the moon, my dad and another gentleman were out in our yard digging a big hole to put cases of liquor down in, and then they capped it off with a washtub that had grass growing in it," she recalls. "And you'd take these handles and lift the washtub up and the liquor was down inside the bank."

Kaye Carver Collins' connection to Foxfire isn't just through her father and her mother, Leona Carver, who was also interviewed by the magazine: In 1973, she was one of the high school students doing Foxfire interviews. She says the books struck a chord across America.

"No matter where you were from in this country, you could find somebody in that book that was like a relative of yours, or like your mom or dad," she says of the books' appeal. "It felt personal to everybody that read it."

While anyone could conduct these interviews, a key part of the Foxfire philosophy is that local students — like 18-year-old Jessica Phillips, a high school senior — do the work.

Fiddle player Bill Lamb makes shingles as students watch.

Courtesy of The Foxfire Fund, Inc.

"This program makes me appreciate that I can go and sit down with these people and just learn," Phillips says. "And make connections that otherwise I wouldn't make."

And, she says, while her friends are busy tapping away at Instagram or Pokemon Go, her experience with Foxfire has taught her that it's OK to slow down. "It makes you realize that you can take that time out ... and go sit on the porch with somebody and talk to him about their stories," she says.

Stiles, Foxfire's acting executive director, says he goes back sometimes and reads the transcripts of interviews that his grandfather and great-uncle did almost 50 years ago.

What stands out most from those interviews is the hardship. It gives him perspective.

"Sometimes I think I'm having a really bad day, and I think about some of the things people had gone through 50 years ago, 100 years ago, and I think, I'm just a whiner," Stiles says.

And yet, part of him longs for what has been lost. That's why he's here: to make sure it isn't lost completely. ●

Edited for space

SCIENCE

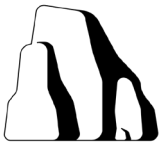
Earth's Mountains May Have Mysteriously Stopped Growing for a Billion Years

Starting about 1.8 billion years ago, the planet's continental crust thinned, slowing the flow of nutrients into the sea and possibly stalling the evolution of life.

MAYA WEI-HAAS | *National Geographic* | Feb. 11, 2021

If you could explore Earth's surface a billion years ago, the most remarkable sight might be the world's un-remarkability. There would be no trees or bugs, nor birds overhead. The only life is simple and small, a slimy oceanic soup.

And a new study published in *Science* points to yet another feature that may be missing: towering mountains.



The restless tectonic plates of modern Earth shift continuously, in a slow-motion dance that reshapes the surface of our planet. Collisions between continents thicken the crust and heave up mountains, such as the Himalayas, that reach ever higher into the skies.

But clues etched into tiny zircon crystals that formed deep in the Earth suggest that plate tectonics didn't always work the same way it does today. In the eon between 1.8 and 0.8 billion years ago — a time dubbed the "boring billion"— the continents seemed to grow progressively thinner. The exact driver of this continental slimming is unknown. But at its most slender, the land was about a third thinner than it is today — a change that researchers suggest may have been caused in part by a slowdown in plate tectonics.

The researchers also posit that this thin crust could have delayed the evolution of life as we know it. Puny mountains would have slowed erosion of the planet's rocks, limiting the supply of life-giving nutrients for creatures in the oceans.

"It's a famine in the oceans at that time," says Ming Tang, a geochemist at Peking University, China, and first author of the new study. But soon after continents began to thicken again, a flush of nutrients seemed to drive evolution to ever larger and more complex life.

"This paper is bringing up more questions than answers," says Christopher Spencer, a geochemist specializing in tectonics at Queen's University, Canada. But overall, he says, the work could provide a "springboard" to better understand how our modern world came to be.

Reading the rocks

Tang was analyzing granite rocks from the Himalaya of southern Tibet when he noticed a curious pattern in their crystals of the mineral zircon. These tiny time capsules form as magma cools within the Earth, recording the chemical fingerprints of ancient conditions on our planet — and they're nearly indestructible.

Researchers have found zircons that formed soon after Earth's birth nearly 4.4 billion years ago.

Tang realized that the chemistry of the zircon crystals from the Tibetan samples changed in step with the continental thickness at the time their parent rocks formed.

Scientists previously determined continental thickness by looking at the relative amounts of the elements lanthanum and ytterbium in the rocks, Tang says. But using the rock itself to peer into the past is difficult because few whole rocks have survived since Earth's infancy, leaving gaps in the geologic history.

"It's been described [as] like reading a novel with three-quarters of the pages missing," says Peter Cawood, a geologist at Monash University, Australia, who was not involved in the new study. The everlasting quality of zircons, however, allows scientists to glimpse a much more complete story of our planet's past.

Tang and his team developed a new way to use the zircons to estimate continental thickness: They found that the amount of the element europium in the crystals changed along with the thickness measured using prior rock chemistry methods.

Tang and his team published their new model last year in *Geology*, then set out to use this new tool. They accrued data from previously studied zircons from around the globe — more than 14,000 in all — and plotted the chemical changes over time. A striking pattern emerged: a steady thinning of the crust throughout the so-called boring billion.

"We didn't expect it," Tang says of the pattern. The thinning coincided with the disappearance of many other markers for ancient mountain building that had previously been identified in the rock record. The strontium composition, which is related to erosion, starkly shifted. Similarly, the elements molybdenum and uranium all but disappeared from marine rocks.

"Mountains are the beginning and the end of all-natural scenery."

JOHN RUSKIN // English writer and philosopher

And phosphorus-rich rocks grew scarce.

"All these can be explained by our model with much flatter continents," Tang says.

Gooey continent cake

Though the exact process behind this crustal winnowing remains uncertain, Tang and his colleagues contend that the change could come, in part, from a slowdown in plate tectonics. Without the continuous upward march, mountain peaks would slowly flatten as erosion by wind and water worked away at the rocks.

The team suggests that this slowdown resulted from changes in how heat was distributed on Earth's surface during the boring billion, when the continents largely clustered in a single supercontinent.

The supercontinent known as Nuna began forming around 2.1 billion years ago. Then, after a minor rearrangement, the supercontinent known as Rodinia took shape, starting some 1.2 billion years ago and lasting nearly a half billion years longer. For more than an eon, the landmass formed a nearly unbroken blanket over a large swath of the planet, trapping in the heat deep below the surface.

Tang suggests that the excess heat beneath the supercontinent would also produce a cooldown under the oceanic crust, affecting the march of tectonic plates.

Slowed tectonics, however, doesn't entirely square with the geologic record, according to Spencer of Queen's University. Though the plates weren't making tremendous leaps around the globe, there was still magmatic activity; nearly 40 percent of North America formed during this time period. If you draw a line between Southern California and Labrador, everything to the southeast took shape between 1.8 and 1 billion years ago, Spencer says — and that couldn't have happened without actively churning tectonics.

Apart from the question of a tectonics slowdown, the idea of the supercontinent blanket raises another possibility: that excess heat building underneath could have weakened the overlying rocks. Such a phenomenon would cause the surface to flatten, since hot rocks can't support high mountain ranges.

"It's a bit like a gooey cake," Cawood says. As long as the sugary structure stays cool, it can hold its shape. Heat it up, and it starts to ooze.

"I think that's really the crux of the paper," Spencer says. Perhaps the thinning crust isn't so much due to a quieting of the tectonic movements that build mountains as to a change in the way these processes worked.

The combination of excess heat and a thin crust could explain an unusual series of rocks that formed during the collisions that produced Rodinia, says Andrew Smye, a metamorphic geologist at Pennsylvania State University who was not part of the study team. These rocks seem to have formed at temperatures hotter than expected for the depth—but a hot, thin crust could account for that.

Though Tang argues that both intermittent tectonics and weakened crust were likely in play, he says there's still much to learn about what our planet looked like eons ago. His team's work adds even more intrigue to the boring billion, and underscores a point some scientists have brought up in the past: Perhaps this age may have not been so dull.

"I don't think it was boring. It wasn't quiet or quiescent," says Cawood, who instead coined the term "Middle Age." But he notes that the name is irrelevant: What's important is that the period was markedly different.

"Clearly there's something interesting going on here," Smye says. ●

Edited for space

RANDOM-NEST

Types of Mountains

FRASER CAIN | *UNIVERSE TODAY* | APRIL 23, 2009

Fold Mountains | The most common type of mountain in the world are called fold mountains. When you see vast mountain ranges stretching on for thousands of kilometers, those are fold mountains. Fold mountains are formed when two of the Earth's tectonic plates collide head on; like two cars crashing together. The edges of each tectonic plate crumple and buckle, and these create the mountains. Some examples of fold mountain ranges include the Rocky Mountains in North America, and the Himalayan Mountains in Asia.

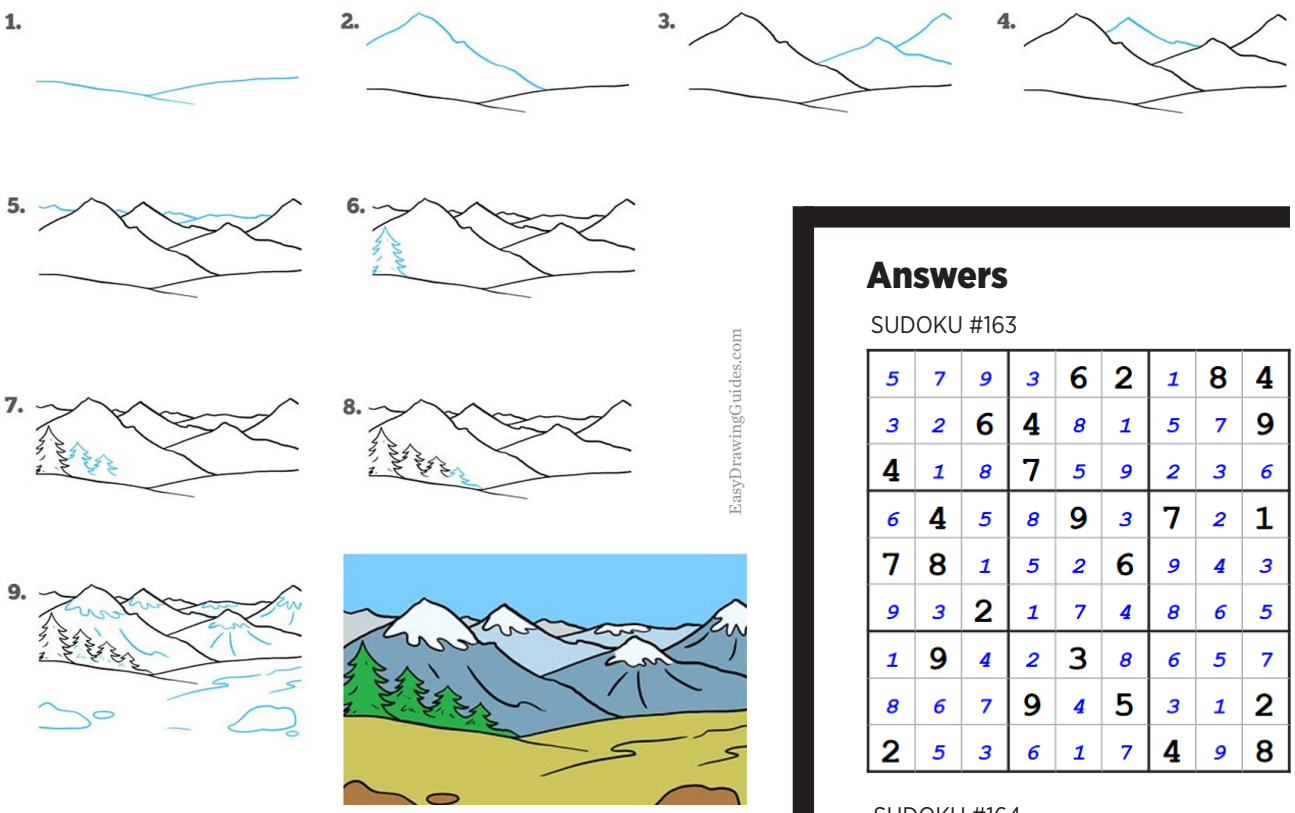
Fault-Block Mountains | Fault-block mountains (or just "block mountain") are created when faults or cracks in the Earth's crust force materials upward. So instead of folding, like the plate collision we get with fold mountains, block mountains break up into chunks and move up or down. Fault-block mountains usually have a steep front side and then a sloping back side. Examples of fault-block mountains include the Sierra Nevada mountains.

Dome Mountains | Dome mountains are created when a large amount of magma pushes up from below the Earth's crust, but it never actually reaches the surface and erupts. And then, before it can erupt, the source of the magma goes away and the pushed up rock cools and hardens into a dome shape. Since the dome is higher than its surroundings, erosion works from the top creating a circular mountain range.

Volcanic Mountains | Here's a fairly familiar kind of mountain. Volcanic mountains are created when magma from beneath the Earth makes its way to the surface. When does get the surface, the magma erupts as lava, ash, rock and volcanic gases. This material builds up around the volcanic vent, building up a mountain. Some of the largest mountains in the world were created this way, including Mauna Loa and Mauna Kea on the Big Island of Hawaii. Other familiar volcanoes are Mt. Fuji in Japan and Mt. Rainier in the US.

Plateau Mountains | Plateau mountains are actually formed by the Earth's internal activity; instead, they're revealed by erosion. They're created when running water carves deep channels into a region, creating mountains. Over billions of years, the rivers can cut deep into a plateau and make tall mountains. Plateau mountains are usually found near folded mountains.

HOW TO DRAW ...



Words of Encouragement

In our general desire as humans for comfort and safety, mountains pose as an interesting outlier. While beautiful feats of nature, they accompany their own unique set of obstacles, as well. However, every day people feel the call to experience and conquer these challenges for the glory of the climb. For example, Mount Everest, the Earth's highest mountain at 8,848.86 meters, has one of the largest failure-to-finish rates of any mountain, even with a nick-named "death zone" on its trail. Still, nearly 900 people around the world each spring are willing to risk everything to climb Mount Everest.

Georgy Mallory was a British explorer and mountaineer who was a leading member for the early English expeditions to Mount Everest. When questioned about the need for these dangerous expeditions, he said, "So, if you cannot understand that there is something in man which responds to the challenge of this mountain and goes out to meet it, that the struggle is the struggle of life itself upward and forever upward, then you won't see why we go. What we get from this adventure is just sheer joy."

Mallory helps us to remind ourselves that our struggles are simply markers of us still preserving forward. Whatever goal you are currently working toward, stay motivated and know that no climb is complete without some stumbles along the way. We hope that you enjoyed this edition of *The Warbler* this week and wish you all the luck in your journey.

Julia

Answers

SUDOKU #163

5	7	9	3	6	2	1	8	4
3	2	6	4	8	1	5	7	9
4	1	8	7	5	9	2	3	6
6	4	5	8	9	3	7	2	1
7	8	1	5	2	6	9	4	3
9	3	2	1	7	4	8	6	5
1	9	4	2	3	8	6	5	7
8	6	7	9	4	5	3	1	2
2	5	3	6	1	7	4	9	8

SUDOKU #164

1	4	7	2	8	5	6	9	3
8	3	6	9	1	7	2	4	5
2	5	9	6	4	3	8	1	7
6	9	2	3	7	4	1	5	8
4	8	3	1	5	9	7	2	6
7	1	5	8	2	6	4	3	9
3	6	1	7	9	2	5	8	4
9	2	4	5	6	8	3	7	1
5	7	8	4	3	1	9	6	2

Rebus Puzzle

Page 6

1. Scattered showers
2. Out of the ordinary
3. Set the clocks back

Send ideas and comments to:

APAEP
1061 Beard-Eaves
Memorial Coliseum
Auburn University, AL 36849